

<b>Notice of Allowability</b>	Application No.	Applicant(s)	
	10/036,813	HARDY ET AL.	
	Examiner	Art Unit	
	Fred Ferris	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 2 November 2005.
2. ☒ The allowed claim(s) is/are 1-32.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All   b) ☐ Some\*   c) ☐ None   of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
  - \* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
  - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |   |  |
|---|--|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                | 6. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),<br>Paper No./Mail Date _____ | 7. <input type="checkbox"/> Examiner's Amendment/Comment                               |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material          | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance   |
|   | 9. <input type="checkbox"/> Other _____.   |

### DETAILED ACTION

1. *Claims 1-32 have been presented for examination based on applicant's amendment filed 2 November 2005. Claims 1-32 have now been allowed over the prior art of record.*

### *Drawings*

2. *Applicant's proposed drawing correction (replacement sheet) to Figure as submitted 2 November 2005 has been approved by the examiner. Applicants request for inclusion of color drawings for figures 5, 6, 7, 8A, and 8B as petitioned under 37 CFR 1.84 is acknowledged.*

### EXAMINER'S AMENDMENT

3. *An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.*

*The application has been amended as follows:*

*Amend the first line of claim 9 by deleting the number "9" after the word "claim" and **inserting** the number "**1**". Line 1 of claim 9 should now read as follows:*

*"The method of claim **1** wherein the at least..."*

*Amend claim line 3 of claim 29 by inserting the word "a" between the words defining and subsurface. The third line of claim 29 should now read as follows:*

*“(a) defining a subsurface model ...”*

### **Response to Arguments**

4. *Applicant's arguments filed 2 November 2005 with respect to claims 1-32 have been fully considered and found to be persuasive.*

*Regarding applicant's response to double patenting rejection: The examiner withdraws the obviousness-type double patenting rejection in view of applicant's Terminal Disclaimer filed 2 November 2005.*

*Regarding applicant's response to 101 rejections: The examiner withdraws the 101 rejection in view of applicant's amendment to the claims.*

*Regarding applicant's response to 103 rejections: The examiner withdraws the 103 rejection in view of applicant's amendment to the claims and arguments submitted 2 November 2005.*

### **Allowable Subject Matter**

5. *Claims 1-32 are allowed over the prior art of record.*

*The following is an examiner's statement of reasons for allowance:*

*Applicants are disclosing a computer implemented method for modeling the failure of a borehole in a subsurface formation by defining a subsurface model including regions of interconnected nodes, liner, casing, earth formation, and material properties in specifying a deformation pattern model. This has been disclosed in the prior art of record.*

*However, the prior art does not disclose the specific method steps inclusive of using a dynamic range relaxation algorithm (DRAA, See: specification page 9, line 11 to page 12, line 3, Fig. 2) in finding a force equilibrium solution for a subsurface model (Specification: page 7, line 13, pages 10, line 10 to 15, line 7) and an initial deformation pattern providing a deformed model (Specification: page 10, lines 19-42) that includes fracturing and faulting as now recited in independent claims 1, 18, and 29.*

*The closest prior art uncovered during examination teaches certain limitations of the claimed invention as follows:*

*U.S. Patent 6,069,118 issued to Hinkel et al: teaches simulation of hydraulic fracturing in a subsurface formation inclusive of fluid forces and particle movement but does not teach specific method steps inclusive of using a dynamic range relaxation algorithm (DRAA) in finding a force equilibrium solution for a subsurface model including an initial deformation pattern providing a deformed model.*

*"Hydraulic Fracture Simulation with the Distinct Element Method", de Pater: teaches simulating fracturing in a subsurface formation inclusive of fluid forces and particle movement but also does not teach specific method steps inclusive of using a dynamic range relaxation algorithm (DRAA) in finding a force equilibrium solution for a subsurface model including an initial deformation pattern providing a deformed model.*

*U.S. Patent 6,078,867 issued to Plumb et al: teaches a borehole mesh model consisting of interconnecting nodes used in modeling analysis of borehole failure but again does not teach specific method steps inclusive of using a dynamic range relaxation algorithm (DRAA) in finding a force equilibrium solution for a subsurface*

*model including an initial deformation pattern providing a deformed model inclusive of fracturing and faulting.*

*The features noted above therefore render the claimed invention non-obvious over the prior art of record. Dependent claims 2-17, 19-28, and 30-32 are deemed allowable as depending from independent claims 1, 18, and 29 respectively.*

*It is further noted that the examiner has given patentable weight to the preamble of independent claims 1, 18, and 29 since, in this case, the preamble limits the body of the claims. MPEP 2163 recites the following:*

*"The examiner should evaluate each claim to determine if sufficient structures, acts, or functions are recited to make clear the scope and meaning of the claim, including the weight to be given the preamble. See, e.g., Bell Communications Research, Inc. v. Vitalink Communications Corp., 55 F.3d 615, 620, 34 USPQ2d 1816, 1820 (Fed. Cir. 1995) ("[A] claim preamble has the import that the claim as a whole suggests for it."); Corning Glass Works v. Sumitomo Elec. U.S.A., Inc., 868 F.2d 1251, 1257, 9 USPQ2d 1962, 1966 (Fed. Cir. 1989) (The determination of whether preamble recitations are structural limitations can be resolved only on review of the entirety of the application "to gain an understanding of what the inventors actually invented and intended to encompass by the claim. ")."*

*In this case, the preamble recitation of "method which models failure of a borehole in a subsurface formation" is further defined in the body of the claim as defined by a subsurface model including regions of interconnected nodes, liner, casing, and earth formation, and material properties specified in a deformation pattern model where a force equilibrium solution is found using DRRA.*

*Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."*

**Conclusion**

6. *Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fred Ferris whose telephone number is 571-272-3778 and whose normal working hours are 8:30am to 5:00pm Monday to Friday. Any inquiry of a general nature relating to the status of this application should be directed to the group receptionist whose telephone number is 571-272-3700. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached at 571-272-2279. The Official Fax Number is: (703) 872-9306*

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